

# TERRESTRIAL GAMMA RADIATION IN RELATION TO THE POPULATION DISTRIBUTION IN WESTERN SWEDEN

**Martin Tondel, MD, PhD, *Occupational and Environmental Medicine, Department of Public Health and Community Medicine, University of Gothenburg, Gothenburg, Sweden***

e-mail: Martin.Tondel@amm.gu.se

**Background and Aims:** After excluding contribution from radon, 42% of the average effective dose from natural background radiation in Sweden comes from terrestrial gamma radiation (TGR). In the county of Vastra Gotaland, western Sweden, the TGR is relatively high and originates mainly from granite, but the county has also areas with low TGR (0-500 nGy/h). This study aims to investigate the distribution of TGR in relation to the population (population-weighted average).

**Methods:** Data for the study comes from aerial measurements in the database at the Swedish Geological Survey. The digital database has unique measurements for each 200 x 200 meter grid for uranium, thorium and potassium, respectively. TGR can be calculated in nGy/h with conversion factors for the three nuclides. Each individual in Vastra Gotaland (n=1.5 million) was retrieved from the population registry with the dwelling coordinates. Using the Geographical Information System the coordinates of the individual's home was matched with the level of TGR. TGR for each municipality in the county was calculated as 1) an average of the grid cells (surface-weighted average) and 2) the population-weighted average, respectively.

**Results:** The population-weighted average of TGR for Vastra Gotaland was 56 nGy/h. There was a tendency of higher population-weighted municipality average compared to the surface-weighted average i.e. the population distribution was skewed towards regions with higher TGR. In the 49 municipalities the median population-weighted average was 55 nGy/h, Sotenäs had the highest 118 nGy/h and the Trollhättan municipality had the lowest average of 37 nGy/h.

**Conclusions:** This study shows that the population-weighted average of TGR for the municipalities in Vastra Gotaland was higher than the surface-weighted average. This is probably a random phenomenon, but important to keep in mind when designing and evaluating ecological studies.